

Simplify the following polynomial expressions.

1. $4^3 \cdot 4^6$

4^9

2. $\frac{4x^3y^{-5}}{10x^7y^2}$

$\frac{2}{5x^4y^7}$

3. $\{3x^2 + 4x - 5\} + \{x^2 - 7x + 1\}$

$4x^2 - 3x - 4$

4. $(2x^2 - 5) - (4x^2 - x - 6)$

$-2x^2 + x + 1$

5. $\frac{(2x^3)^4 5y^4 z^0}{20x^{-4}y^9}$

$\frac{16x^{12} 5y^4 z^0}{20 y^9} x^4 = \frac{4x^{16}}{y^5}$

6. $(x+3)(x^2 - 6x + 1)$

$x^3 - 6x^2 + x + 3x^2 - 18x + 3$

$x^3 - 3x^2 - 17x + 3$

7. $\frac{(x+4)(x-4)}{x+4}$

$x-4$

8. $\frac{(2x+5)(x-3)}{(x-3)(2x-1)}$

$\frac{2x+5}{2x-1}$

9. $\frac{(x+1)(x-1)}{x^2-1} = \frac{x+1}{x-3}$

10. $\frac{x^2 - 4x + 1}{x - 3}$

$$\begin{array}{r|rrrr} 3 & 1 & -4 & 1 & \\ & & 3 & -3 & \\ \hline & 1 & -1 & -2 & \end{array}$$

$(x-1) \cdot \frac{-2}{1}$

11. $\frac{x^3 + 3x^2 - 4x + 6}{x - 2}$

$$\begin{array}{r|rrrrr} 2 & 1 & 3 & -4 & 6 & \\ & & 2 & 10 & 12 & \\ \hline & 1 & 5 & 6 & 18 & \end{array}$$

$(x^2 + 5x + 6) \cdot \frac{18}{1}$

12. $\frac{x^4 - 3x^2 - 2x + 5}{x + 4}$

$$\begin{array}{r|rrrrrr} -4 & 1 & 0 & -3 & -2 & 5 & \\ & & -4 & 16 & -52 & 216 & \\ \hline & 1 & -4 & 13 & -54 & 221 & \end{array}$$

$(x^3 - 4x^2 + 13x - 54) \cdot \frac{221}{1}$

Factor the following polynomials using any method possible.

13. $x^3 - 225/25$

$$\begin{array}{r|rrrr} 5 & 1 & 0 & 0 & -125 \\ & & 5 & 25 & 125 \\ \hline & 1 & 5 & 25 & 0 \end{array}$$

$(x-5)(x^2 + 5x + 25)$

14. $x^2 - 3x - 4$

$(x-4)(x+1)$

15. $x^5 - 4x^3 - 2x^2 + 8$

$x^3(x^2 - 4) - 2(x^2 - 4)$

$(x^3 - 2)(x^2 - 4)$

$(x^3 - 2)(x+2)(x-2)$

Part 2

16. $y^4 \cdot y^{10}$

$$y^{14}$$

17. $(x^7)^3$

$$x^{21}$$

18. $(2x^2)^3(5xy^3)^2$

$$8x^6(25x^2y^6)$$

$$200x^8y^6$$

19. $\frac{3x^9y^{-2}}{x^{-7}y^2}$

$$\frac{3x^9x^7}{y^2y^2} = 3x^{16}y^{-4}$$

20. $\frac{50x^{-3}y^5}{2x^5y^{-9}}$

$$\frac{25y^5y^9}{x^3x^5} = \frac{25y^{14}}{x^8}$$

21. $\frac{(2x^3)^0 5y^2}{(2x)^{-3}y^{-5}z^{-3}}$

$$\frac{5y^2 8x^3y^5z^3}{1} = 40x^3y^7z^3$$

22. $(x^2 + 2x - 1) - (3x^2 + 5x + 7)$

$$-2x^2 - 3x - 8$$

20. $(x^2 - 4x + 3) + (5x - 3)$

$$x^2 + x$$

21. $(x - 2)(x^2 - 5x + 1)$

$$x^3 - 5x^2 + x - 2x^2 + 10x - 2$$

$$x^3 - 7x^2 + 11x - 2$$

22. $4x + 3(2x^2 - 5x + 1)$

$$4x + 6x^2 - 15x + 3$$

$$6x^2 - 11x + 3$$

23. $\frac{(x+3)(x-4)}{x+3} = x-4$

24. $\frac{(x+5)(2x+1)}{(2x+1)(x-5)} = \frac{x+5}{x-5}$

25. $\frac{(2x+1)(2x-1)}{(2x-1)(x-1)} = \frac{2x+1}{x-1}$

26. $\frac{5x^2 - 3x + 2}{x - 4}$

$$\begin{array}{r|rrrr} 4 & 5 & -3 & 2 & \\ & & 20 & 68 & \\ \hline & 5 & 17 & 70 & \end{array}$$

$$(x-4)(5x+17) R \frac{70}{1}$$

27. $\frac{x^4 + 3x^2 - 4x + 6}{x + 2}$

$$\begin{array}{r|rrrrrr} -2 & 1 & 0 & 3 & -4 & 6 & \\ & & -2 & 4 & -14 & 36 & \\ \hline & 1 & -2 & 7 & -18 & 42 & \end{array}$$

$$(x+2)(x^3 - 2x^2 + 7x - 18) R \frac{42}{1}$$

28. $\frac{x^3 - 2x + 5}{x - 1}$

$$\begin{array}{r|rrrrr} 1 & 1 & 0 & -2 & 5 & \\ & & 1 & 1 & -1 & \\ \hline & 1 & 1 & -1 & 4 & \end{array}$$

$$(x-1)(x^2+x-1) R \frac{4}{1}$$

Factor the following polynomials using any method possible.

29. $x^2 - 3x + 2$

$(x-2)(x-1)$

30. $2x^2 - 3x - 5$

$(2x-5)(x+1)$

31. $2x^3 - x^2 + 6x - 3$

$x^2(2x-1) + 3(2x-1)$

$(2x-1)(x^2+3)$

32. $x^3 - 1$

$$\begin{array}{r|rrrr} 1 & 1 & 0 & 0 & -1 \\ & & 1 & 1 & 1 \\ \hline & 1 & 1 & 1 & 0 \end{array}$$

$(x-1)(x^2+x+1)$

33. $x^4 - 16$

$(x^2+4)(x^2-4)$

$(x^2+4)(x+2)(x-2)$

34. $25x^2 - 16$

$(5x+4)(5x-4)$

35. $3x^4 - x^2 - 2$

$(3x^2+2)(x^2-1)$

$(3x^2+2)(x+1)(x-1)$

36. $x^3 - 5x^2 + 10x - 50$

$x^2(x-5) + 10(x-5)$

$(x^2+10)(x-5)$

37. $3x^3 + 9x^2 - 12x$

$3x(x^2+3x-4)$

$3x(x+4)(x-1)$

38. $2x^3 - 54$

$2(x^3-27) \div (x-3)$

$$\begin{array}{r|rrrr} 3 & 1 & 0 & 0 & -27 \\ & & 3 & 9 & 27 \\ \hline & 1 & 3 & 9 & 0 \end{array}$$

$2(x-3)(x^2+3x+9)$

39. $75x^{10} - 3x^8$

$3x^8(25x^2-1)$

$3x^8(5x+1)(5x-1)$

40. $x^3 + 8 \xleftarrow{(2)^3} \div (x+2)$

$$\begin{array}{r|rrrr} -2 & 1 & 0 & 0 & 8 \\ & & -2 & 4 & -8 \\ \hline & 1 & -2 & 4 & 0 \end{array}$$

$(x+2)(x^2-2x+4)$